CASE STUDY - 11 Microscope Work	
TASK TITLE: Microscope Work	
Task Description:	The type of microscope on which this case study is based is the traditional two eye-piece microscope with focus and adjustment controls. The length of time preparing and examining slides varies significantly for microscope tasks as well as the type of work that is typically performed. Typical jobs in which microscope work is performed include (not necessarily limited to): • hospital laboratories • environmental testing laboratories
Job Performance Measures Most often impacted by Microscope Work:	Error rates, number of slides examined and identified
Typical Employee Comments about Microscope Work:	Employees most often comment on their concern over the repetitive nature of microscope work. work. Employees typically complain about discomfort and/or stiffness in the hands/wrists, arms, shoulders/neck, and head/eyes.
Suggested Level II Analysis:	Postural analysis, light level analysis.

Shoulder/Neck

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
1. Arms held away from body	• Microscope/work surface too high	30. Lower work surface: • set the height of the microscope so that the microscope controls are about half way between resting elbow height and shoulder height.	✓		low	low	med
	• Chair positioned too low	85. Raise chair: • set the height of the chair so that the microscope controls are about half way between resting elbow height and shoulder height; • be sure to provide adequate support for the feet.	✓		low	low	low
	• Person reaches to write on document which is too far away on work surface	35. Move item in work zone: • move the document closer to the edge of the work surface; • items which are used every few minutes or more should be placed close to the body.	✓		low	med	med
	• Person does not rest the hand while writing	18. Install palm rest: • provide a place for the person to rest the hand while writing; • encourage the person to rest the hand while writing.	✓		low	low	low

Shoulder/Neck

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
	• Chair positioned too far away	37. Move microscope closer to edge.	✓		low	low	low
	• Arms of chair or other obstructions interfere with moving chair closer  **Figure 11.1**	90. Remove or lower armrests: • remove or adjust armrests or obstructions if they prevent the person from moving close enough to the workstation. • attach armrests as extensions to the worksurface.	✓	✓	low to med	med	med
		78. Provide proper chair: • provide a chair in which the armrests can be adjusted or removed.		✓	med to high	med	med
	• Lack of leg clearance under desk	89. Remove clutter from under work surface.	✓		low	med	med
	• Items used frequently not positioned close to the body	35. Move item in work zone: • items which are used every few minutes or more should be placed closest to the body.	✓		low	med	med
2. Repeated reaching	• Items used frequently not positioned close to the body	35. Move items in work zone. • Provide foot controlled focusing mechanisms to reduce reaching associated with frequent control adjustments.	✓		low	med	med

Shoulder/Neck

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
		34. Move items closer to body: • prioritize the location of items on the workstation according to frequency of use; • those items which are more frequently used should be closer to the body and more easily accessible	✓		low	med	med
3. Shrugging: working with the shoulders shrugged	• Microscope too high	30. Lower work surface: • set the height of the microscope so that the microscope controls are about half way between resting elbow height and shoulder height.	✓		low	low	med
	• Chair positioned too low	85. Raise chair: • set the height of the chair so that the microscope controls is about half way between resting elbow height and shoulder height; • be sure to provide adequate support for the feet.	✓		low	low	low
4. Repeated arm forces	• Rarely occurs	N/A					
5. Holding/ carrying materials	• Rarely occurs	N/A					

Shoulder/Neck

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
6. Cradling the telephone between the neck and shoulder	• Rarely occurs	N/A					
7. Head Bent down, up, or neck twisted	• Eye piece on microscope is too low	87. Raise the work surface: • set the height of the microscope so that the eye piece is at eye height. • change the eyepiece height to enable the worker to sit with the head upright.	✓	✓	low to med	low	med
	• Chair too high	28. Lower chair • set the height of the chair so that the work surface is about half way between resting elbow height and shoulder height	✓		low	low	med
	• Eye piece on microscope is at an inappropriate angle	4. Angle work surface to bring work closer to the body and the eye: • adjust the angle of the microscope; • provide a microscope with an adjustable eye piece.	✓	 ✓	low high	low med	med med

Shoulder/Neck

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
	• Data recording sheets are positioned flat on work surface. (see Figure 11.2)  **Figure 11.2**	4. Angle work surface to bring work closer to the body and the eye: • if data collection sheet is manipulated frequently or written on, an inclined work surface is preferred; • the inclined surface should be able to be moved easily and, preferably, adjustable in incline; • the inclined surface needs a stop at the bottom to hold papers; • the inclined surface can be a purchased accessory or it can be made by taping several empty 3-ring binders together and taping a clip board or a piece of card board at the bottom to hold papers.	✓		med	med	med

Hands/Wrists/Arms

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
8. Bent wrists	• Microscope controls too high • Microscope controls are at an inappropriate angle	30. Lower work surface: • set the height of the microscope so that the microscope controls are about half way between resting elbow height and shoulder height.	✓		low to med	low	med
	• Chair is too low	85. Raise chair: • set the height of the chair so that the microscope controls is about half way between resting elbow height and shoulder height; • be sure to provide adequate support for the feet.	✓		low	low	med
		88. Redesign job: • break up continuous microscope tasks with other types of tasks.		✓	low to med	med	med
	• Person rests wrists on table while operating controls.	95. Train proper body mechanics posture: • encourage person to maintain straight wrists while using controls; • encourage person to keep wrists free while using controls; encourage person to avoid bending the wrists while resting the hands.	✓		low	low	low

Hands/Wrists/Arms

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
		14. Install adjustable forearm rests: • an arm rest can provide a comfortable place to rest the arms so that the worker doesn't need to rest on the wrists • build up the surface immediately under the controls so wrists rest on a surface without being bent.	✓		low	low	low
9. Repeated wrist movements	• Rarely occurs	N/A					
10. Repeated finger movements		88. Redesign job: • break up continuous microscope tasks with other types of tasks.		✓	low to med	med	med
11. Hyper-extension of finger/thumb	• Rarely occurs	N/A					
12. Hand forces	• Gripping the controls too hard.	96. Train proper body mechanics: • encourage person to practice using as light a grip as possible on the controls.	✓		low	low	low

Hands/Wrists/Arms

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
13. Hard edges	• Wrists rest on edge of work surface	18. Install palm rest: • the hard edge can be eliminated by attaching a rounded edge to the front edge of the work surface.		✓	low to med	low	low
		• a palm rest can provide a comfortable place to rest when not keying and encourages neutral wrist posture;	✓		low	low	low
		38. Move microscope forward so forearms rest evenly on surface: • this allow the person to minimize contact with a hard edge.	✓		low	low	low
	• Hard arm rests	94. Train worker to properly adjust chair: • attach padding to the armrests to eliminate exposure to hard edges.	✓		low	low	low
		78. Provide proper chair: • provide a chair with padded armrests.		✓	med to high	low	low
14. Repeated forearm rotation	• Rarely occurs	N/A					

Back/Torso

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
15. Leaning forward or poor lower back posture	• Eye piece on microscope is too low	87. Raise work surface: • set the height of the microscope so that the eye piece is at eye height.	✓		low to med	low	med
	• Chair too high	28. Lower chair: • set the height of the chair so that the work surface is about half way between resting elbow height and shoulder height.	✓		low	low	med
	• Eye piece on microscope is at an inappropriate angle	4. Angle work surface to bring work closer to the body and the eye: • adjust the angle of the microscope;	✓		low	low	med
		• provide a microscope with an adjustable eye piece.		✓	high	med	med
	• Data recording document positioned flat on work surface.	4. Angle work surface to bring work closer to the body and the eye: • if document is handled, flipped or written on, an inclined work surface is preferred; • the inclined surface should be able to be moved easily and, preferably, adjustable in incline;	✓		med	med	med

Back/Torso

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
		• the inclined surface needs a stop at the bottom to hold papers; • the inclined surface can be a purchased accessory or it can be made by taping several empty 3-ring binders together and taping a clip board or a piece or card board at the bottom to hold the papers.					
	• Person has a habit of leaning forward while working	95. Train proper body mechanics: • encourage person to rest the back against back rest and sit back and relax while working; • encourage person to push his or her chair toward the workstation in order to reduce the tendency to lean forward.	✓		low	med	med
	• Inappropriate chair adjustment	94. Train worker to properly adjust chair: • adjust back rest to support lower back; • attach a small pillow to back rest to support lower back.	✓		low	med	med
	• Inadequate chair	78. Provide proper chair:		✓	med to	med	med

Back/Torso

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
		• provide a chair with a back rest; • provide a chair with adequate lower back support.			high		
	• Chair arms interfere with moving chair closer	90. Remove or lower armrests: • remove or adjust armrests, pencil drawers or other obstructions if they prevent the person from moving close enough to the workstation. • attach auxiliary armrests as extensions to the worksurface.	✓		low to med	med	med
		78. Provide proper chair: • provide a chair in which the armrests can be adjusted or removed.		✓	med to high	med	med
	• Seat pan on chair is too deep	75. Provide back support: • attach a pillow to back rest to decrease the seat pan depth and support the lower back;	✓		low	med	med
		• provide a chair with an adequate/adjustable seat pan depth and adequate lower back support.		✓	med to high	med	med

Back/Torso

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
		28 Lower chair: • adjust the chair height so that the person's heels and toes can both rest comfortably on the floor or foot ring on the stool; • care must be given to insure that adjusting the chair for the feet does not cause problems for the hands, wrists, and arms.	✓		low	low	low
16. Repeated bending	• Reaching for items too far from body  **Figure 11.3**	35. Move item closer to body: • position items so they can be reached without leaning forward; • prioritize the location of items on the workstation according to frequency of use.	✓		low	med	med
17. Lifting forces	• Rarely occurs	N/A					
18. No foot support	• Chair too high	28 Lower chair: • adjust the chair height so that the person's heels and toes can both rest comfortably on the floor or other foot rest; care must be given to insure that adjusting the chair for the feet does not cause problems for the hands, wrists, and arms.	✓		low	low	low

Back/Torso

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
	• Feet are unsupported	76. Provide footrest: • adjust height of foot ring on chair (e.g., build up with wood, if not adjustable) • provide a footrest which allows both the heels and toes to be supported;	✓		low to med	low	low

Legs/Feet

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
19. Edge of seat or work surface presses into legs	• Feet are not supported	76. Provide footrest: • adjust height of foot ring on chair (e.g., build up with wood, if not adjustable). • provide a footrest which allows both the heels and toes to be supported.	✓		low to med	low	low
		28 Lower chair: • adjust the chair height so that the person's heels and toes can both rest comfortably on the floor or other foot rest; • care must be given to insure that adjusting the chair for the feet does not cause problems for the hands, wrists, and arms.	✓		low	low	low
	• Seat pan has a hard front edge	94. Train worker to properly adjust chair: • provide a cushion for the seat pan to prevent contact with hard edge.	✓		low to med	low	low
		78. Provide proper chair: • provide a chair with a rounded front edge on the seat pan		✓	med to high	med	med

Legs/Feet

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
	• Seat pan too long	75. Provide back support: • attach a pillow to back rest to decrease the seat pan depth and support the lower back; • provide a chair with an adequate/adjustable seat pan depth and adequate lower back support.		✓	med	low	low
	• Obstructions under work surface interfere with leg clearance and expose person to hard edges: – pencil drawers; – or structural supports.	89. Remove clutter from under work surface: – eliminate obstructions – remove pencil drawers – move position of microscope (sideways) to eliminate interference with under-table obstructions.	✓	✓	low to med	med	med
20. Hard floor surfaces	• Rarely occurs	N/A					
21. Kneeling/ squatting	• Rarely occurs	N/A					

Head/Eyes

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
22. Staring at screen or document	• Length of work task without a change of position for the eyes	45. Periodically look away from microscope to change the task demand on the eye and focus on an object of varying distance	✓		low	med	med
		13. Incorporate health comfort strategies: – alternate tasks – stretch – take rest pauses	✓		low	med	med
23. Glare	• Glare directly from a light source: looking towards an uncovered window	8. Close blinds or curtains: • provide window coverings if not available.	✓	✓	low	med	med
	• Task light shines into eyes	9. Cover or turn out under-cabinet lighting: • replace under-cabinet lighting with an adjustable desk lamp.		✓	low to med	med	med

Head/Eyes

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
24. Light levels.	• Light level too high or too low to use microscope	31. Lower light levels: • Equalize light levels entering "microscope eye" and eye exposed to room light.		✓	low to med	med	med
25. Screen distance	• Rarely occurs	N/A					
26. Difficult to read	• Detail difficult to see in microscope	12. Improve visibility: • provide a more powerful, better quality microscope;		✓	low	med	med